



# **REPORT ON STATUS OF SCHOOL BROADBAND CONNECTIVITY CAPABILITY**

OFFICE OF TECHNOLOGY AND VIRTUAL LEARNING  
DIVISION OF INSTRUCTION  
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## Introduction

High-speed Internet access via broadband is no longer a luxury option that schools should consider providing if available. High-speed Internet access via broadband is now essential to providing a quality education to all students. A quality education system that seeks to prepare students for college and career readiness must include high-speed Internet access via broadband that provides students access to digital learning options that enable students to have deeper learning experiences. As schools and divisions work to provide student-centered, personalized learning for students, access to digital resources is essential.

The State Educational Technology Directors Association Broadband Imperative II: Equitable Access for Learning report, released in September 2016, provides the following recommendations for policy makers and school leaders:

1. Increase infrastructure to support student-centered learning
2. Design infrastructure to meet capacity targets
3. Ensure equity of access for all students outside of school
4. Leverage state resources to increase broadband access

As part of legislative efforts in the Commonwealth of Virginia to increase and provide information to school leaders about broadband access, in the 2016 Appropriation Act (Item 137.G), the General Assembly directed school divisions to report to the Department of Education (DOE), by November 1 of each year, the status of broadband connectivity capability of schools in the division. School divisions were directed to report the following information:

1. School-level information on the method of Internet service delivery,
2. Level of bandwidth capacity and the degree such capacity is sufficient for delivery of school-wide digital resources and instruction,
3. Degree of internet connectivity via Wi-Fi,
4. Cost information related to Internet connectivity,
5. Data security and such other pertinent information as determined by the DOE.

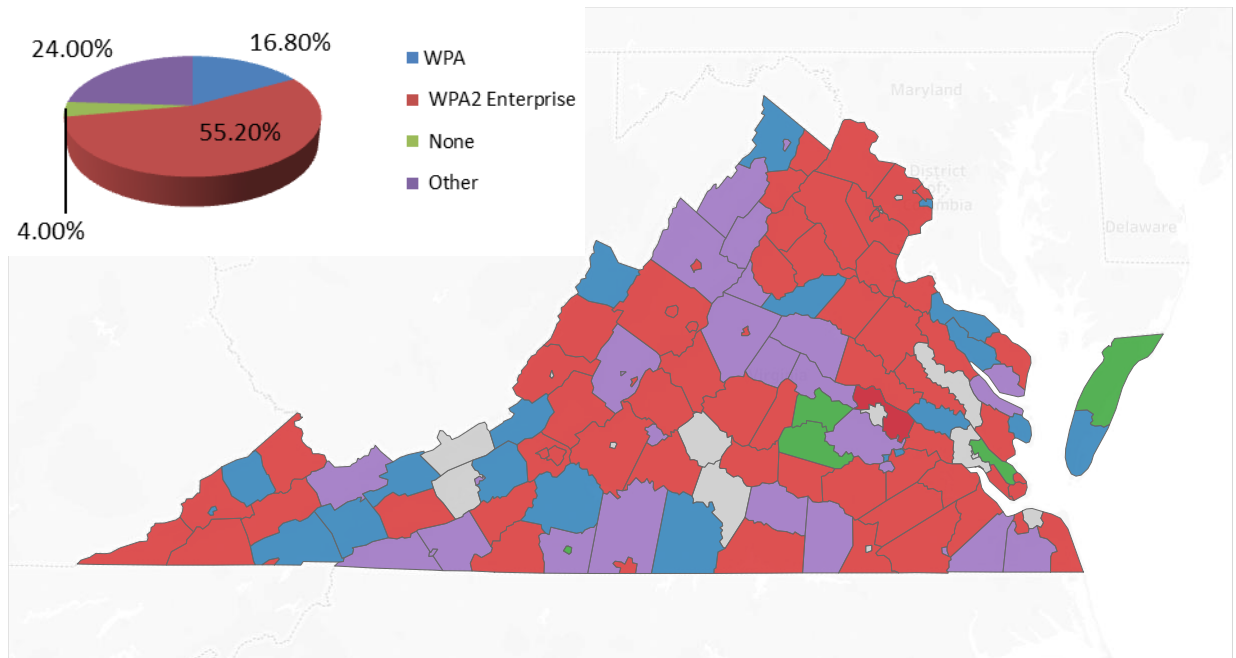
In response to the General Assembly directive, the DOE collaborated with EducationSuperhighway (ESH) to collect data from school divisions. Through an email sent to school divisions by the DOE K-12 Learning Infrastructure Program on behalf of ESH, school divisions were provided broadband connectivity information and asked to confirm the information. The broadband connectivity information was collected from school division E-rate filings submitted to the Universal Service Administrative Company that administers the E-rate program. ESH has confirmed and is currently analyzing the broadband connectivity information confirmed by school divisions. The DOE collected data security, broadband implementation, and other pertinent information via the survey shown in Appendix A. While the analysis of school division data collected by ESH continues, the DOE provides this report on data security, broadband implementation, and other pertinent information reported by school divisions via survey.



Once information from ESH is received, this report will be revised to include the additional information.

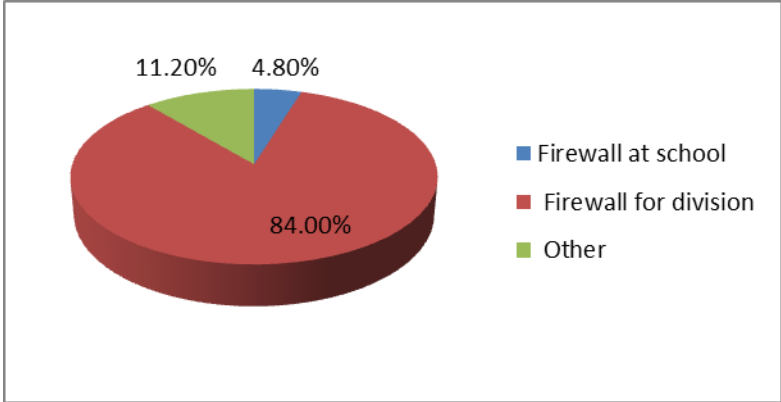
### Summary of Results

1. School divisions were asked to provide information related to data security. Survey responses indicate the following:
  - a. For authentication methods used to access school Wi-Fi networks, more than half (55%) of school divisions use WPA2 Enterprise.
  - b. The second most commonly used methods (24%) were other methods such as MAC address filtering and variations of WPA2 other than Enterprise level.

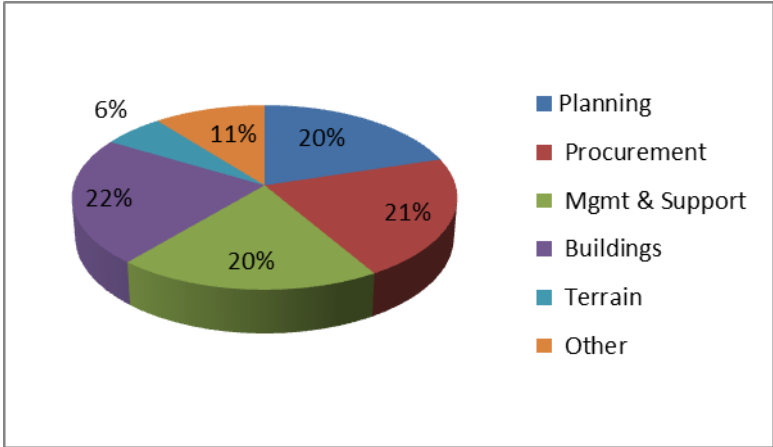




2. For firewall architecture structure used at schools, the majority of school divisions (84%) used one firewall for the division instead on at every school.

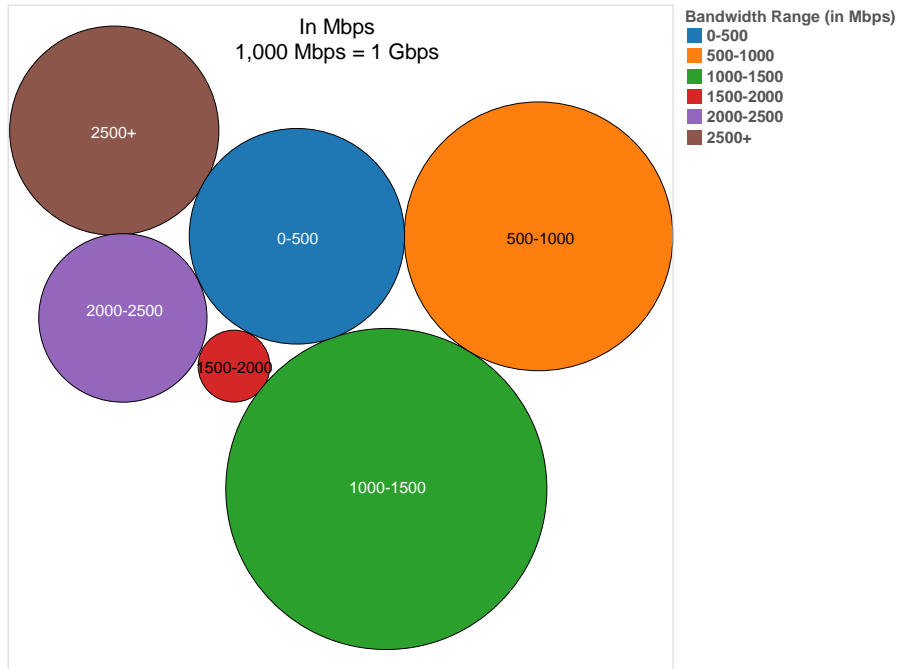


3. When asked about the barriers to a robust internal (LAN/Wi-Fi) network for a school division, the most common (22%) barrier was the layout of buildings or the physical structure of a building. The second most common barrier was a combination of three barriers consisting of procurement, planning, and management & support.



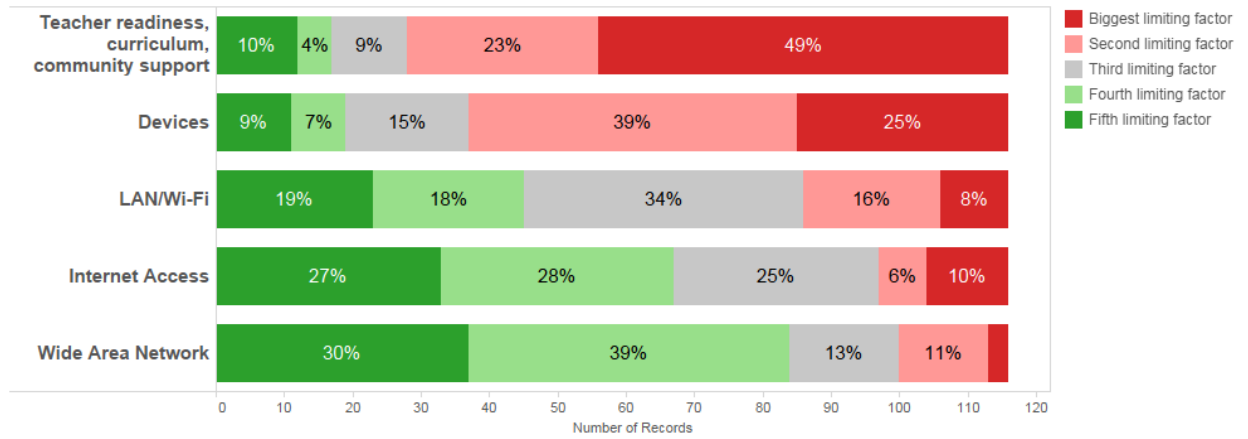


4. The average anticipated bandwidth needed for overall (instructional and administrative) connectivity at schools over the next year was 7 Gbps. Bandwidth needs ranged from a high of 600 Gbps to a low of 30 Mbps. The most common bandwidth need was 1 Gbps.





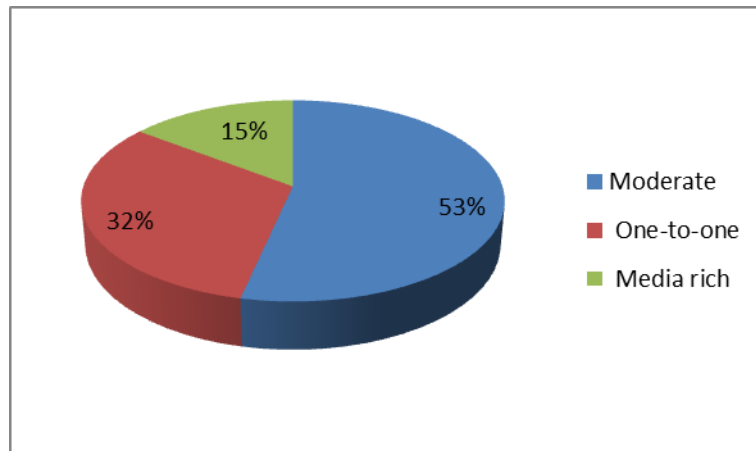
5. School divisions indicated teacher readiness, curriculum, and community support as the biggest limiting factors to their ability to deliver digital learning to their students. Device access was the second biggest factor.





- 6. In describing technology usage within their school division with usage classified as:
  - a. Moderate (Technology use is variable and typically driven by individual teachers; devices are primarily in labs or on carts),
  - b. One-to-one (Technology is widely available; most students interact with a device most school days), or
  - c. Media rich (Every student has a technology-enabled learning experience most school days; streaming video is widely supported).

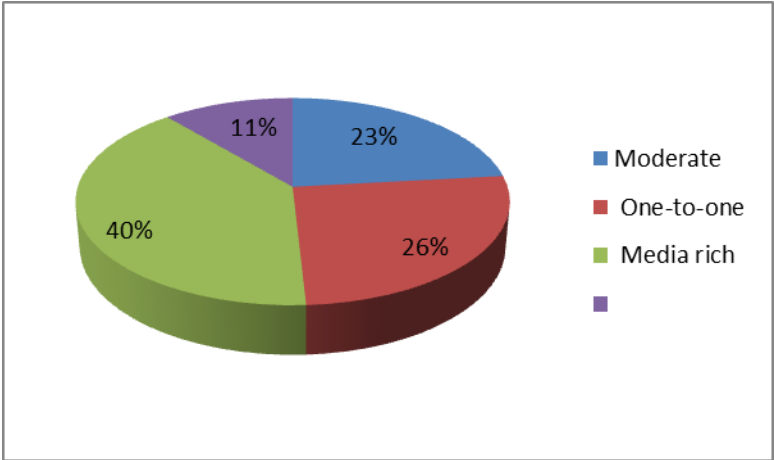
Most school divisions described their technology usage as Moderate (53%), followed by One-to-One (32%).







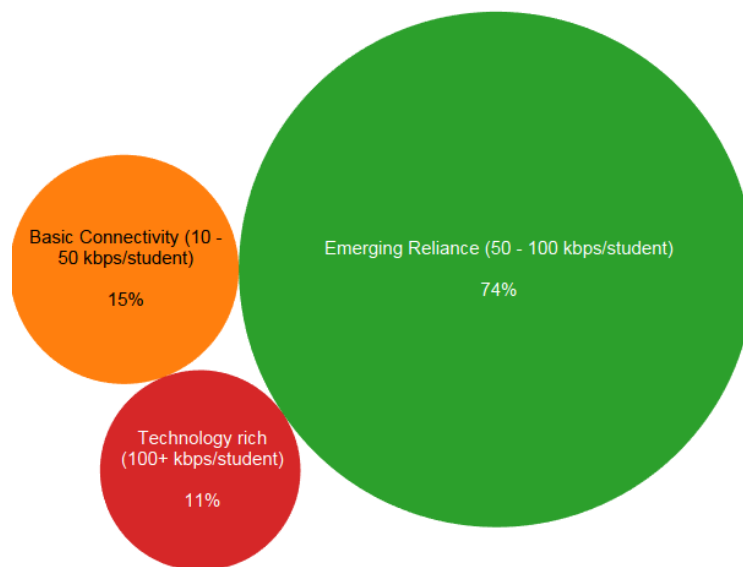
7. Using the same classifications used in item #6, when asked to describe technology usage in their school division for the next school year if network connectivity (broadband, WAN, and LAN/Wi-Fi) was not a constraint most school divisions described their technology usage as Media Rich (40%), followed by One-to-one (26%).





8. The State Educational Technology Directors Association provides the following definitions for technology usage:
  - a. Pre - Basic (<10 kbps/student; basic activities; limited by bandwidth),
  - b. Basic Connectivity (10 - 50 kbps/student; rotational computer lab; basic online research and email activities),
  - c. Emerging Reliance (50 - 100 kbps/student; implementation of partial 1:1; dynamic content/streaming video; Web projects; Web-based office/student management, and
  - d. Technology rich (100+ kbps/student; full 1:1; media rich content; robust Web-based projects/courses, student management, and conferencing).

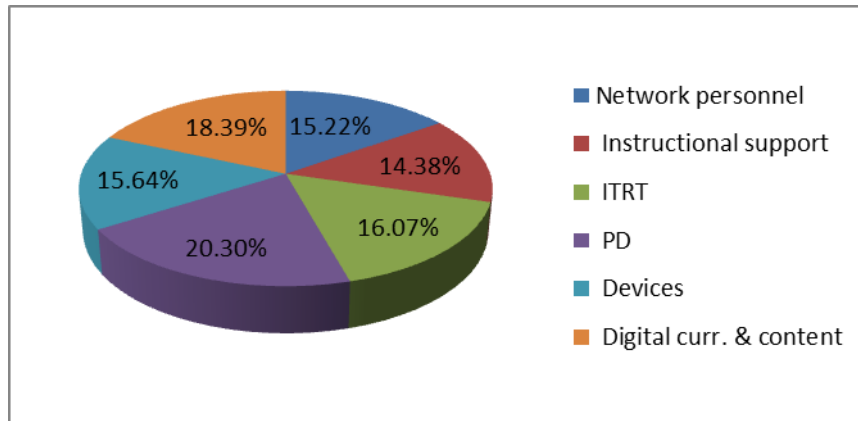
Most school divisions described technology usage in their school division as “Emerging Reliance” (74%).



9. On average 72% of the students in school divisions use devices in class. Responses ranged from a low of 10% to a high of 100%. The most common response was 100%.
10. Of the students using devices in class, the devices are used 46% of instructional time. Responses ranged from a low of 10% to a high of 100%. The most common response was 50%.



11. Schools divisions indicated professional development (20%), digital curriculum and content (18%), and Instructional Technology Resource Teachers (16%) as the top three resources needed to support digital learning in their division.



12. Only 14% of school divisions indicated they had sought a broadband upgrade in the last year but been unable to afford the price they were quoted.

13. Half of all school divisions plan to update their overall broadband network in the next year.

14. Less than 10% of school divisions are served by a single broadband provider.

15. Approximately 34% of the routers and switches used by school divisions are older than 5 years.

16. Approximately 81% of the structured network cabling used by school divisions is Cat 5e or newer.

17. Approximately 80% of school divisions plan to upgrade any LAN/Wi-Fi infrastructure in the next 12 months.



## Appendix A

### Department of Education Broadband Connectivity Capability Survey Data Security Questions

1. Please select your division from the dropdown menu.
2. What authentication method is used to access school Wi-Fi networks?
  - a. WPA
  - b. WPA2 Enterprise
  - c. None
  - d. Other (please specify)
3. What firewall architecture structure is used at schools?
  - a. Fire wall at every school
  - b. One firewall for the division
  - c. Other (specify)

### Broadband and Implementation Questions

4. What are your biggest barriers to a robust internal (LAN/Wi-Fi) network in your division?
  - a. Planning (assessing needs, securing support from district leadership, budgeting w/E-rate funding)
  - b. Procurement (designing competitive process, develop RFP specifications, hold suppliers accountable, filing E-rate)
  - c. Management & support (Network monitoring, reports on your WAN and ISP, planning and budgeting for refresh cycles)
  - d. Buildings layout/physical structure
  - e. Local terrain inhibiting connectivity
  - f. Other (specify)
5. What are the anticipated bandwidth needs for overall (instructional and administrative) connectivity at schools in your school division over the next year? (1000 Mbps = 1 Gbps)
  - a. \_\_\_\_\_ Mbps
6. What limits your school division's ability to deliver digital learning to your students? Rank your choices below, where 1 = biggest limiting factor, 2 = second biggest limiting factor, etc.
  - a. Devices
  - b. Wide Area Network
  - c. Internet Access
  - d. LAN/Wi-Fi



- e. Environmental factors (teacher readiness, curriculum, community support)
7. How would you describe technology usage in your school division?
  - a. Moderate (Technology use is variable and typically driven by individual teachers; devices are primarily in labs or on carts)
  - b. One-to-one (Technology is widely available; most students interact with a device most school days)
  - c. Media rich (Every student has a technology-enabled learning experience most school days; streaming video is widely supported).
8. Using the State Educational Technology Directors Association definitions for technology usage, how would you describe technology usage in your school division?
  - a. Pre - Basic (<10 kbps/student; basic activities; limited by bandwidth)
  - b. Basic Connectivity (10 - 50 kbps/student; rotational computer lab; basic online research and email activities)
  - c. Emerging Reliance (50 - 100 kbps/student; implementation of partial 1:1; dynamic content/streaming video; Web projects; Web-based office/student management)
  - d. Technology rich (100+ kbps/student; full 1:1; media rich content; robust Web-based projects/courses, student management, and conferencing)
9. If network connectivity (broadband, WAN, and LAN/Wi-Fi) was not a constraint, what would technology usage in your school division look like next year?
  - a. Moderate (Technology use is variable and typically driven by individual teachers; devices are primarily in labs or on carts)
  - b. One-to-One (Technology is widely available; most students interact with a device most school days)
  - c. Media rich (Every student has a technology-enabled learning experience most school days; streaming video is widely supported)
  - d. Other (specify)
10. Approximately what percentage of your students use devices in class?
  - a. 0 – 100 sliding scale
11. Of the students that use devices in class, approximately what percentage of instructional time are devices used?
  - a. 0 – 100 sliding scale
12. What are the resources you need to support digital learning in your school division?
  - a. Network personnel
  - b. Instructional support
  - c. Instructional Technology Resource Teachers
  - d. Professional development
  - e. Devices
  - f. Digital curriculum and content



13. Have you sought a broadband upgrade in the last year but been unable to afford the price you were quoted?